

IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Sub B1
AF
Claim 1 (Original): An auto-focus apparatus comprising:
an image pickup means for converting light from an object through a focus lens system to electric signals and outputting the signals as image data;
an A/D converting means for A/D-converting the image data to obtain digital image signals;
an AF evaluating means for outputting an AF evaluated value obtained by integrating high-frequency components of brightness data for the digital image data;
a sampling means for sampling the AF evaluated value obtained by said AF evaluating means while driving a position of said focus lens system;
a recording pixel number setting means for setting a number of recording pixels of said image pickup means for recording an image; and
a focus driving means for determining a focus according to a result of sampling of the AF evaluated value by said sampling means and driving said focus lens system to the focus position; wherein
amount of shift of said focus lens system for each sampling when sampling the AF evaluated value is changed according to a number of recording pixels set by said recording pixel number setting means.

Claim 2 (Original): An auto-focus apparatus according to Claim 1 further comprising:
an AF locking means for holding a focus position after the auto-focus operation is executed; and

a disabling means for disabling, under operation of the AF locking means, change of a number of recording pixels in said image pickup means for recording an image by said recording pixel number setting means.

Claim 3 (Currently Amended): An auto-focus apparatus comprising:

an image pickup means for converting light from an object through a focus lens system to electric signals and outputting the signals as image data;

an A/D converting means for A/D-converting the image data to obtain digital image signals;

an AF evaluating means for outputting an AF evaluated value obtained by integrating high-frequency components of brightness data for the digital image data;

a sampling means for sampling the AF evaluated value obtained by said AF evaluating means while driving a position of said focus lens system;

a recording pixel number setting means for setting a number of recording pixels of said image pickup means for recording an image; and

a focus driving means for determining a focus according to a result of sampling of the AF evaluated value by said sampling means and driving said focus lens system to the focus position; wherein

during a first auto-focus operation, amount of shift of said focus lens system for sampling the AF evaluated value is set to a maximum and a substantial focus position is calculated; and during a second auto-focus operation and subsequent auto-focus operations thereafter, amount of shift of said focus lens system for sampling the AF evaluated value is decreased and set at a position closer to the substantial focus position ~~to a minimum and the a~~ final focus position is obtained; and

thereby a number of times the auto-focus operations are performed is changed according to the number of recording pixels set by said recording pixel number setting means and each auto-focus operation subsequent to said first auto-focus operation has a decreased amount of shift of said focus lens system.

Claim 4 (Original): An auto-focus apparatus according to Claim 3 further comprising:

an AF locking means for holding a focus position after the auto-focus operation is executed; and

a disabling means for disabling, under operation of the AF locking means, change of a number of recording pixels in said image pickup means for recording an image by said recording pixel number setting means.

Claim 5 (Original): An auto-focus apparatus comprising:

an image pickup device which converts light from an object through a focus lens system to electric signals and outputting the signals as image data;

an A/D converter which A/D-converts the image data to obtain digital image signals;

an AF evaluating unit which outputs an AF evaluated value obtained by integrating high-frequency components of brightness data for the digital image data;

a sampling unit which samples the AF evaluated value obtained by said AF evaluating unit while driving a position of said focus lens system;

a recording pixel number setting unit which sets a number of recording pixels of said image pickup device for recording an image; and

a focus driving unit which determines a focus according to a result of sampling of the AF evaluated value by said sampling unit and driving said focus lens system to the focus position; wherein

amount of shift of said focus lens system for each sampling when sampling the AF evaluated value is changed according to a number of recording pixels set by said recording pixel number setting unit.

B1
Cont

Claim 6 (Original): An auto-focus apparatus according to Claim 5 further comprising:

an AF locking unit which holds a focus position after the auto-focus operation is executed; and

A5
cont

a disabling unit which disables, under operation of the AF locking unit, change of a number of recording pixels in said image pickup device for recording an image by said recording pixel number setting unit.

Claim 7 (Currently Amended): An auto-focus apparatus comprising:

an image pickup device which converts light from an object through a focus lens system to electric signals and outputting the signals as image data;

an A/D converter which A/D-converts the image data to obtain digital image signals;

an AF evaluating unit which outputs an AF evaluated value obtained by integrating high-frequency components of brightness data for the digital image data;

a sampling unit which samples the AF evaluated value obtained by said AF evaluating unit while driving a position of said focus lens system;

a recording pixel number setting unit which sets a number of recording pixels of said image pickup device for recording an image; and

a focus driving unit which determines a focus according to a result of sampling of the AF evaluated value by said sampling unit and driving said focus lens system to the focus position; wherein

during a first auto-focus operation, amount of shift of said focus lens system for sampling the AF evaluated value is set to a maximum and a substantial focus position is calculated; and during a second auto-focus operation and subsequent auto-focus operations thereafter, amount of shift of said focus lens system for sampling the AF evaluated value is decreased and set at a position closer to the substantial focus position to a minimum and the a final focus position is obtained; and

thereby a number of times the auto-focus operations are performed is changed according to the number of recording pixels set by said recording pixel number setting unit and each auto-focus operation subsequent to said first auto-focus operation has a decreased amount of shift of said focus lens system.

Claim 8 (Original): An auto-focus apparatus according to Claim 7 further comprising:

an AF locking unit which holds a focus position after the auto-focus operation is executed; and

a disabling unit which disables, under operation of the AF locking unit, change of a number of recording pixels in said image pickup device for recording an image by said recording pixel number setting unit.

Claim 9 (Original): A control method for auto-focus apparatus comprising the steps of:

B1
Cont

converting light from an object through a focus lens system to electric signals and outputting the signals as image data by an image pickup device;

A/D-converting the image data to obtain digital image signals;

outputting an AF evaluated value obtained by integrating high-frequency components of brightness data for the digital image data;

sampling the AF evaluated value obtained by said AF evaluating step while driving a position of said focus lens system;

setting a number of recording pixels of said image pickup device for recording an image; and

determining a focus according to a result of sampling of the AF evaluated value by said sampling step and driving said focus lens system to the focus position; wherein

AS
Cont

amount of shift of said focus lens system for each sampling when sampling the AF evaluated value is changed according to a number of recording pixels set by said recording pixel number setting step.

Claim 10 (Original): A control method for auto-focus apparatus according to Claim 9 further comprising the steps of:

holding a focus position after the auto-focus operation is executed; and

disabling, under operation of said holding step, change of a number of recording pixels in said image pickup device for recording an image by said recording pixel number setting step.

Claim 11 (Currently Amended): A control method for auto-focus apparatus comprising:

converting light from an object through a focus lens system to electric signals and outputting the signals as image data by an image pickup device

A/D-converting the image data to obtain digital image signals;

outputting an AF evaluated value obtained by integrating high-frequency components of brightness data for the digital image data;

sampling the AF evaluated value obtained by said AF evaluating step while driving a position of said focus lens system;

setting a number of recording pixels of said image pickup device for recording an image; and

determining a focus according to a result of sampling of the AF evaluated value by said sampling step and driving said focus lens system to the focus position; wherein

during a first auto-focus operation, amount of shift of said focus lens system for sampling the AF evaluated value is set to a maximum and a substantial focus position is calculated; and during a second auto-focus operation and subsequent auto-focus operations thereafter, amount of shift of said focus lens system for sampling the AF evaluated value is decreased and set at a position closer to the substantial focus position ~~to a minimum and the a~~ final focus position is obtained; and

thereby a number of times the auto-focus operations are performed is changed according to the number of recording pixels set by said recording pixel number setting step and each auto-focus operation subsequent to said first auto-focus operation has a decreased amount of shift of said focus lens system.

Claim 12 (Original): A control method for auto-focus apparatus according to Claim 11 further comprising the steps of:

holding a focus position after the auto-focus operation is executed; and

Application No. 09/365,863
Reply to Office Action of May 23, 2003

*B1
cont
AB
cont*
disabling, under operation of said holding step, change of a number of recording
pixels in said image pickup device for recording an image by said recording pixel number
setting step.
